diffusion barriers compromise the quality of an ion-driven etch, separate plasma processing chambers are often used when both ion-assisted etching and chemically driven etching is to be performed. Correspondingly, the present invention relates to a semiconductor manufacturing apparatus having a diffusion barrier that can be positioned in multiple positions relative to the wafer. In one position, the diffusion barrier acts to inhibit diffusion of neutral species which may compromise etch uniformity or quality of chemically driven etch processes. In another position, the barrier is recessed so as to not disturb an ion-assisted etch process.

Rejections Under 35 U.S.C. § 103

Claims 1 stands rejected under 35 U.S.C. §103 as being unpatentable over U.S. Patent 6,042,687 to Singh et al. (hereinafter referred to as "Singh") in view of U.S. Patent 5,552,124 to Su (hereinafter referred to as "Su"). Applicants respectfully disagree.

Singh describes a plasma processing system having a primary and secondary gas supply. The secondary gas supply is concentrated near the periphery of the substrate to improve etching/deposition uniformity across the substrate surface.

Singh does not teach or remotely suggest a barrier as recited. The Office Action uses a gas ring of Singh to show a diffusion barrier (page 4, lines 3-6). Applicants are unsure which of the many gas rings described in Singh are referred to. Regardless, Applicants respectfully disagree. The gas rings of Singh do not teach a barrier as recited. The Office Action dated October 11, 2000 states that this point is not clearly understood since gas rings and focus rings are both used to balance gas flow above a substrate. All of the gas rings of Singh are gas injectors that supply process gases into a processing chamber (see Column 1, lines 34-45). In contrast, diffusion barriers and focus rings inhibit diffusive transport/ exchange of gaseous reactants and byproducts near the substrate perimeter (according to Singh, column 2, lines 15-21). A gas injector that supplies gas flow is not structurally analogous to a barrier or wall that inhibits gas flow. Thus, Applicants respectfully submit that a gas supply as taught by Singh does not teach or reasonably suggest a barrier as recited in independent claims 1 and 8.

Singh briefly mentions the use of diffusion barriers (column 2, lines 15-24). This further compromises the Office Action assertion that the gas rings of Singh are diffusion barriers. Regardless, this brief mention of diffusion barriers does not teach a barrier as recited in independent claims 1 and 8. Applicants note that Singh teaches against the use of diffusion barriers and focus rings (column 2, lines 25-30). Singh specifically states that "one problem with systems employing focus rings is that

polymers generated from gaseous by-products or reactants are sometimes deposited on the focus rings. During subsequent substrate processing, this deposited polymer can cause undesirable contamination of the substrate being processed." Clearly, Singh teaches against use of a diffusion barrier.

Su describes a stationary focus ring for use in a plasma reactor during wafer processing. The stationary focus ring includes slots that allow process gases to pass during wafer processing.

Su does not address the deficiencies of Singh. The Office Action asserts that the focus ring of Su is movable (Office Action page 3, paragraph 3). Applicants respectfully disagree. Su specifically mentions that his focus ring is stationary (see the Abstract and column 4, line 60, for example).

Thus, neither Singh or Su, either alone or in combination, teach a "barrier having a first position relative to the wafer wherein the first position relative to the wafer substantially facilitates etch uniformity for a chemically driven etch process, and having a second position relative to the wafer wherein the second position relative to the wafer does not interfere with the etch uniformity of an ion driven etch process" as recited.

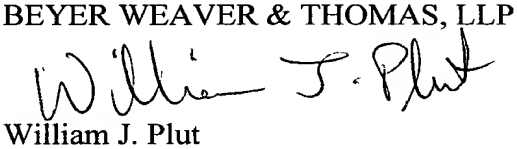
The Office Action states that it would have been obvious for one of skill in the art to modify Singh with the moveable focus ring of Su since Su also uses focus rings as a diffusion barrier. Applicants respectfully disagree. The focus ring of Su is stationary. Secondly, Singh teaches against a diffusion barrier and uses multiple gas inlets. Moreover, Singh specifically teaches against Su (see Column 2, lines 16-30). Thus, Applicants respectfully submit that combining the references as described in the Office Action dated October 11, 2000 is improper, and that the combination would not have been motivated to produce the results described in the Office Action.

Correspondingly, Singh and Su, either alone or in combination, do not teach or remotely suggest a barrier as recited in independent claims 1 and 8. Further, Singh teaches against combination with Su. Withdrawal of the rejection of claims 1-13 based on 35 U.S.C. § 103(a) is therefore respectfully requested.

In view of the foregoing, Applicants believe that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

If any fees are due in connection with the filing of this paper, the Commissioner is authorized to charge such fees to Deposit Account 50-0388 (Order No. LAM1P111).

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP



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Limited Recognition under 37 C.F.R.§10.9(b)

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